Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1.9
F763C

LIBRARY
RECEIVED
★ MAY 21 1934 ★
U. S. Department of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

MAR 1934

M—5105

U. S. GOVERNMENT PRINTING OFFICE: 1930

8—7417a

BRANCH OF RESEARCH

March, 1934.

Page

CONTENTS

Forest Experiment Stations

Allegheny 1
Appalachian 1
California 4
Central States 10
Lake States 13
Northeastern 14
Northern Rocky Mountain 16
Pacific Northwest 19
Southern 25
Southwestern 28

Region 2 34

Manuscripts 37

ALLEGHENY FOREST EXPERIMENT STATION

The Station's major concern during the past winter has been the effective expenditure of emergency funds available to us. From 15 to 20 "white collar" CWA workers have been crowded into our small building, and in 3-1/2 months have accomplished an extremely satisfactory volume of office work. Individual tree records from the loblolly pine study, covering some 30,000 items, have been tabulated for punching. The Allegheny hardwoods project has been materially advanced; quadrat records, requiring a tremendous amount of painstaking and detailed examination, have been summarized, a correlation between soil types and forest types has been worked out, the inventory of the Kane Experimental Forest has been analyzed, and a great variety of computations have been made from the extensive survey data of 1928-30. Weather records from Camp Ockanickon, which are always tedious and time-consuming to analyze, have been searched for significant material. A very large number of translations have been made by Dr. Doak, and the herbarium has been put in shape. In the field, 10 men have been working on fire lines and similar jobs at Camp Ockanickon and the new branch station on the Lebanon State Forest, and on the Kane Experimental Forest from 6 to 12 men have been busy on similar work. One man from the Wharton School of Finance at the University of Pennsylvania, has been doing a very competent job in the study of requirements of secondary wood-using industries in our territory.

Forbes has devoted a considerable part of his time to the formulation of a code of woods practices for our territory, in conjunction with the other Forest Service men concerned, and has been able to borrow some invaluable stand table data for the oak types from the Anthracite Forest Protective Association and the Pennsylvania Forest Research Institute.

Interest in the purchase of the Tionesta virgin forest has steadily grown. Forbes has been asked to speak on the subject before two organizations of women, and his article on "The Thousandth Acre" will be widely distributed by the Pennsylvania Forestry Association. The Association, and also the Botany Department of the University of Pennsylvania, are making a determined effort to bring about the purchase of an adequate portion of this magnificent virgin forest. The major purpose of scientific use is being emphasized by the Association to a surprising degree.

On the Kane Experimental Forest cutting was completed on the two sets of stand improvement plots. Eight acres in all have been included in these plots, and all of the customary sample plot measurements have been completed, as well as the actual cutting on the thinned plots. Good silviculture prescribed the cutting of about 10 cords per acre, which the Supervisor Bishop judged to be an economic operation.

-----#-----

APPALACHIAN FOREST EXPERIMENT STATION

Management - Mountain Region

Buell and Besley re-examined six plots on the Berea, Kentucky College Forest. The first four of these are methods-of-cutting plots, 1/2 acre to 3-1/2 acres in size, established in 1923. The two treated plots were subjected to a controlled cutting in 1923. They make an interesting comparison

(Over)

because one was accidentally burned since treatment, while the other has never been burned. Although the results of this, the second regular five year periodical examination, have not been compiled, it is very apparent that the growth on the unburned plot is very much greater than that on the burned plot. On the former a great many trees have grown two inches and more during the last five year period, while on the burned plot the continuing mortality, coupled with the relatively small growth of the living trees, have probably resulted in only a slight volume increase.

Much damage done to young reproduction and larger trees by grape vines, was noticed on both of the cut plots in 1928. At that time one acre in one of the cut plots was treated by cutting all grape vines. This work apparently had little effect, for the treated section now seems to be as badly infested with grapes as the other parts of the plots.

Two plots were established in 1926 to study the growth and development of a young stand on an abandoned old field surrounded by forest growth. Each plot is a square acre, in the four corners of each are subplots one-half chain square. For the present the tally is taken on these subplots alone. One of the most striking occurrences since the last examination has been the complete replacement of sassafras on many of these subplots by Virginia pine. In 1928 many of the sassafras trees were 10 to 15 feet high but were already beginning to die. Now the trunks of these trees are lying on the ground and a thick growth of Virginia pine has sprung up where they stood.

Barrett and MacKinney completed establishment of fourteen thinning plots in loblolly pine on the Alabama unit of the Cherokee National Forest. They were ably assisted by Cultural Foreman F. A. Kuhn and G. A. Bergoffen.

Management - Coastal Plain

All of the loblolly pine seed gathered this year by the North Carolina Forest Service was cleaned by flotation in water. The cleaned seed showed a viability of 99.99 per cent by cutting tests. To check the method of cleaning several samples of seed which had been cleaned by fanning were further cleaned by flotation. Samples of 200 seeds each were dumped in water and stirred thoroughly. Also a number of samples were put in an empty jar and then subjected to a forcible stream of water for a few minutes. In both cases all floating seeds were removed immediately.

In the first method 20 per cent of the seeds floated. Of these 56 per cent were aborted. This shows a loss by flotation of 9.9 per cent of the good seeds in the samples. When the seeds were subjected to a stream of flowing water for a short period 13 per cent of the seeds floated. Cutting tests showed that these floating seeds included only 4.7 per cent of the good seeds in the samples. These tests indicate that flotation of loblolly pine seed may be used to advantage if the maximum of viable clean seed is desired at the expense of losing approximately 5 per cent of the good seed. Further data will be gathered on the efficiency of this method of cleaning loblolly pine seed on a commercial scale.

Another interesting point was brought up in the study of loblolly pine seeds. Periodic weighings of the same samples of 200 seeds each exposed to air in the laboratory showed a variation in weight of the samples of ± 2.55 per cent. The variations in weight were highly correlated with relative humidity.

Data on some loblolly pine trees 12 years after release by partial cutting showed a computed leaf surface of 2,625 square feet on a long crowned tree, with dense foliage, as compared to 106.1 square feet on a thin foliaged, short crowned tree. Leaf surface area data for eight trees showed a high correlation with current rate of growth. Green weight of needles showed almost as high a correlation.

Forest Influences

Investigations of practical erosion control are now in progress. This work, under the field direction of Harvey Loughead, Technician, is testing out different methods of breaking down steep gully sides for planting, the construction of brush dams and diversion ditches, and the use of stem cuttings of local tree species, particularly poplars, willows, sycamore, and black locust. In addition several kinds of herbaceous cover are being tried out to determine their efficiency in holding eroding soil in place pending its natural restocking to trees. A small nursery area is being prepared by ECW labor on an upper northeast slope considered to be particularly suitable for propagation of hardwoods. The Station has purchased 900 pounds of lespedeza and grass seed to be used in connection with practical erosion control investigations under CWA.

Hugh Creasman, Assistant Technician, has been stationed on the Coweeta Experimental Forest to supervise the installation of weirs on small streams as a part of the development of the experimental forest. The present installations will consist of placing a V-notch weir and establishing a suitable silting basin and ponding basin for each weir. The streams to be measured are flowing at an approximately uniform rate of 0.20 - 0.50 cubic feet per second This is considered to be the most sensitive type of stream in this region. Subsequently it is intended to observe larger streams made up from the smaller tributaries on which the primary installations are being placed.

Fire weather

The spring season of fire-weather forecasting was opened on March 1. All observers started reporting on this date, and forecasts were issued daily except Sundays during the entire month. These were forwarded by telegraph to District Foresters and Forest Supervisors in this district, and in addition they were broadcast over radio stations WWNC, WNOX, WDOD, and WSM. The Asheville station handled the forecast daily at 9:45 a.m., and the other stations in Knoxville, Chattanooga, and Nashville broadcast them only on days of prevailing fire hazard.

One of the difficulties in the way of full utilization of fire-weather forecasts is that they cannot be made available to fire wardens and rangers by regular channels without considerable expense. In order to facilitate

their distribution arrangements have been made to have them received by radio at the CCC Camps at regular times daily. In this way they become available to fire-fighting crews.

Forest Pathology

Investigation of the southeastern pine canker disease continued at Asheville. Diller established additional sample plots in slash pine plantations in South Carolina and is now scouting generally in Maryland, New Jersey and Pennsylvania. Lohman made several series of inoculations in planted pines at Clemson College and Winston-Salem, and in native shortleaf pine at the Bent Creek Experimental Forest.

Forest Entomology

Huckenpahler completed the inspection of cutting in pine stands at CCC Camps to determine the danger of inducing southern pine beetle and Ips bark-beetle attacks.

Sixty-five state and Federal camps were visited. State camps throughout the southeast have been cutting pine continuously since June 1933. At several of the camps a few scattered small trees had been killed by Ips grandicollis but no southern pine beetle attacks were found.

-----#-----

CALIFORNIA FOREST EXPERIMENT STATION

Forest Management - Pine Region

Mr Quadrats

Planimetering of areas was completed during the month for 980 milacre quadrats. For most of these quadrats mappings before and after logging were planimetered in order to determine changes due to logging.

The following table shows changes due to logging on the Stanislaus Woods and Mill Study plots:

Method of Cutting

Area Classification	Forest Service		Economic Selection		Heavy Cut	
	Before Logging	After Logging	Before Logging	After Logging	Before Logging	After Logging
	Area in per cent					
Reproduction Excluded	7.42	21.53	18.35	26.04	10.47	29.80
Shrub Cover	30.72	13.00	31.22	23.17	24.09	9.97
Open	61.86	65.47	50.43	50.79	65.44	60.23
	Number of seedlings in per cent					
Reproduction Excluded	1.12	4.37	8.53	7.32	1.50	14.70
Shrub Cover	38.86	33.21	26.83	28.67	24.00	18.62
Open	60.02	62.42	64.64	64.01	74.50	66.68
Actual Number of Seedlings	893	298	328	164	400	102

Total area in each type of cutting is one-tenth acre.

"Reproduction Excluded" means area covered with rocks, root crowns, logs, trash, and slash piles. Some reproduction is found on this area due to seedlings along the edges of logs. In the future it is planned to map the line of contact with the ground as well as the projection of the edges of logs in order to get the area from which reproduction is absolutely excluded. There are also some seedlings of advance reproduction covered with trash and debris in logging, which are still alive.

ME

A cubic-foot volume table for second growth incense cedar was prepared by H. A. Fowells from data collected by Mitchell, Show, and Dunning in 1912 and 1922.

Forest Management - Redwood Region

The time of Person, Hallin and Stahelin during the past month has been about equally divided among four jobs: completion of the report on the condition of redwood cutover lands, revision of the woods practice section of the lumbermen's code, working plans for the coming field season, and the photograph collection, particularly a revision of our folio of photographs and charts. The station collection has been supplemented by photographs from the University of California Forestry School collection, and from a collection by Dr. Scheidl, of Vienna, who has taken a very large number of pictures as a part of his study of the human geography of the redwood region.

The rough draft of the report on conditions of redwood cutover lands is practically completed and we expect to have typewritten copies, including a large number of charts and photographs, ready before our field work is started.

A complete revision of the woods practice section of the redwood code was made to serve as a basis for comparison with proposals to be submitted by the California Redwood Association at the code meeting to be held early in April.

Range Research

Short, Bentley, Magee, and Johnson completed during March the first phase of the extensive range reconnaissance of foothill grazing lands in the San Joaquin Valley. This phase deals with high-lights of erosion and rodent conditions. Preparations are now in progress for the beginning of the next phase of the survey, relating to distribution, abundance, and growth of the important range plants.

Renner's range bibliography was brought up to date with the aid of CWA workers. The different sections have been referred by the Washington office to twenty-one experts in various bureaus and fields of knowledge.

The Public Works Administration has approved plans for the purchase of a tract of approximately 3500 acres of typical foothill land to be developed into an experimental range.

Fire Control Research

During the month of March, Buck and Fons spent the greater part of their time on the analysis of the visibility data. Brown has been busy with communication and visibility planning conferences. Curry and Dennison have continued the work of analyzing the test-fire rate of spread data.

A large part of the analysis of rate of spread which has been accomplished in the last few months has not been covered in these reports. Some interesting relationships have been developed. Depression of the wet bulb appears to be the most accurate basis for estimating duff moisture content in Ponderosa Pine stands. Rate of perimeter increase can be estimated very closely from measurements on the rate of lineal increase on the fastest spreading sector. An estimating equation was obtained by curvilinear correlation which gives perimeter within a standard error of 25% on twelve-minute fires. The independent variables used are depression of the wet bulb and wind velocities. Confirming Show's findings of nearly twenty years ago, the effect of wind seems to be definitely a parabolic relationship. The formula obtained for twelve-minute fires is

$$P = a + 7.4V^2$$

in which "P" is perimeter in feet at 12 minutes, "a" is a variable dependent on the moisture content determined by the depression of the wet bulb and "V" is the wind velocity over the period of the fire. There is a possibility present of a joint correlation between time, duff moisture and wind velocity, which must be taken into account to obtain any closer approximation of perimeter. Efforts are now being concentrated on determining this joint correlation.

Some work has been done on the new model Kotok saw which differs from the first models in only one respect, the motor. The new motor on first trials appears adapted to the job. It is an eight-horsepower unit weighing 45 pounds, developed by the Reed-Prentice Corporation.

Considerable has also been accomplished in assembling plans and materials for the 1934 field season. Our work will be principally rate of spread studies using test fires. As a result of our analysis we feel the need for better wind records and for accurate temperature determinations. After some investigation we have decided upon a trial of the hot-wire anemometer as a type probably suited for our needs. Fons has been trying out various lengths and sizes of platinum wire in an anemometer constructed by him in the Engineering laboratories, where a wind tunnel is available.

For temperature determination we willrely on thermocouples using chromel-alumel couples of 20 gauge wire insulated by asbestos tubing, with a millivolt meter for recording the current fluctuations.

Work for next year will be concentrated on rate of spread studies in an effort to obtain data on fast burning fires. The weakness of our data in 1933 lies in the fact that it was found necessary, under the plan used, to suppress the fastest burning fires in about 12 minutes. Our data is, therefore, rather one-sided in having a large amount of information on slow burning fires up to 30 minutes or more, but nothing for the same time period on the fastest fires. It is clear that we must prepare carefully in order to control fires under the most favorable burning conditions, after they have burned 20 minutes. This involves considerable planning of organization and withal, some risk.

Forest Products

Logging and Milling Studies

The final technical report on methods of conducting and analyzing woods and mill studies, with detailed illustrative data from the Stanislaus project, although practically completed last year in the best form possible from punch-card runs, has had many rough spots and previously disconcerting inconsistencies ironed out in new compilations by CWA clerks and computers. Several new analyses also were made which were beyond the limitations of the punch cards.

Of special interest in connection with Forest Service timber sales appraisals are some new data on the comparative values per M.B.M. of individual lumber grades cut from different sizes and grades of logs. It is customary to apply the average selling price of each grade to the percentage of that grade in each log diameter group. This is perfectly sound practice for finding log-run value but leads to considerable error in fixing the relative values of different sizes and grades of logs. The average value of B and Better sugar pine, for example, is $70.87 on the basis of Code minimum prices for each thickness, 4/4 to 16/4, weighted according to the distribution of thicknesses in log run. This value is $11.38 higher than the actual value per M of B and Better cut from 22-25-inch grade-1 logs and $1.63 lower than the value of B and Better cut from 70-73-inch logs. The error in just this one grade gives an over-valuation of $1.12 to 22-25-inch logs and an under-valuation of $0.42 to 70-73-inch logs. If width differentials were accounted for also, the range would be still greater. The relative values of B and Better from grade-1 logs for each 5-inch increase in diameter, based on thickness variation only, are as follows:

Log diameter Inches	Value of B & Better per M.B.M.
20	$ 59.22
25	60.30
30	63.80
35	66.60
40	69.10
45	70.75
50	71.60
55	72.05
60	72.35
65	72.40
70	72.45

The variation in other grades is not so great but the cumulative effect of all errors introduced by disregard of thickness distribution in the type of timber represented on the Stanislaus Study area results in a showing of profits on logs which are actually in the red, and fictitious margins, either too high or too low, all the way from one end of the diameter scale to the other.

An article on the Stanislaus Study, submitted to the TIMBERMAN in April, 1933, was published at last in the March, 1934, issue. Attempts to get action by correspondence were about as fruitful of results as the U. S. notes to Japan during the invasion of China. Finally the managing editor chanced to drift into the Station. After our five-minute oration on the value of the information to the lumber industry particularly from the viewpoint of its bearing on the new Code cutting requirements, the editor promised to squeeze it in at once.

Wood Requirements - Building Construction

Analyses of the building permit records of Oakland and Berkeley shows a slight trend toward larger houses since 1914, with the exception of the period immediately following the War. In 1929 house volume in Oakland averaged 23,400 cubic feet, while volume in Berkeley averaged 27,040 cubic feet. In the same year living units in apartment houses averaged about 10,100 cubic feet. Comparison of dimensions given on building permits with those scaled off plans for the same building indicates that volumes from permits average about 10% higher than the actual volume.

Building permits and plans show that one-story houses average about 19.3 feet in height, including an eight-foot basement, with a floor area of 1290 square feet. Two-story houses average about 28.8 feet in height, with a total floor area of 2,106 square feet.

The percentage of houses built with wood siding or shingle exterior has decreased from 39% in 1914 to 11% in 1929. Stucco has steadily gained in use, although its percentage has recently declined slightly from a high point of 89% in 1929.

Whereas 62% of the houses built in 1914 used wood shingles, only 44% of those built in Oakland and 26% in Berkeley were so covered in 1929. The use of composition roofing has fallen off since 1921, but tile has grown in popularity until in 1932 about 28% of the new houses had tile roofs.

Another trend in house construction has been the building of more houses with basements, the percentage for Oakland increasing from 43% in 1914 to 81% in 1932. Preliminary figures indicate that on the average only about 42% of the basement areas is excavated. About 70% of all basements, however, now serve as garages for one or more cars, thus cutting down the lumber requirements for detached garages.

From job descriptions on repair permits it appears that about 72% of repair expenditures go for jobs requiring some lumber, and that 66% of all repairs are made to residential dwellings. Questionnaires have been sent to a number of permittees in an effort to find a ratio between lumber used and cost of repair work.

To calculate board foot-cubic foot converting factors, 24 dwellings in Berkeley were analyzed for volume and for lumber used in construction. The average ratio for rough and finish lumber was 770 board feet per thousand cubic feet of house volume, but the lumber in .664 doors and .635 sash per thousand feet of volume must also be included in the basic requirements.

Only one house was of all wood construction, and the ratio obtained for it suggested that an additional 132 board feet per thousand cubic feet was required for siding. Houses with shingle roofs require an average of about 18 squares of shingles.

An interesting fact is that while the tendency in recent years is toward the use of more wood, especially beams and knotty pine boards for ceilings and walls in living rooms, libraries and halls, the amount of wood in trim has otherwise decreased materially. Baseboards, which were formerly 8" and 10" wide and 1" thick are now 4" and even 2" width and 5/8" thick. Door and window casings have likewise been reduced, and recently plaster reveal construction has reduced wood in these items to near the vanishing point.

Wood Requirements - Wood Using Industries

This investigation, asked for out of a blue sky for the lumber code authorities, has been got under way with all possible speed, two CWA men being assigned. The project has been full of kinks, one of which is to find a way, within the time limit and available personnel, of extending the personal solicitation phase heavily beyond the extent contemplated by Washington. This has become increasingly necessary because of two developments, first that, on the basis of a pretty large sample thus worked, covering San Francisco and all the East Bay cities, representing a combined population of well over a million, the number of establishments not covered by schedules sent us for personal contact nor having received mail schedules from Washington, is larger than the total number included in both of those coverages; and second, that of the establishments contacted who received mail schedules, at least half say that they had not been able to understand what was wanted and had consigned the schedules to file or waste basket with no intention of trying to answer them. In every such case contacted we have been able to get a satisfactory filling out of the schedule by giving them a little personal assistance.

Forestry Statistics

Professor M. S. Benedict of the Giannini Foundation of Agricultural Economics as a result of service for several months at Washington on the staff of the Committee on Government Statistics and information, has asked the cooperation of the California Economic Research Council in working up recommendations on the scope and organization of government statistical work in several branches of agricultural statistics and of forestry statistics. There has therefore been set up by the Council, as one of several special committees for these purposes, a committee on forestry statistics, under the chairmanship of Mr. Hill of the Station. This committee is at work on the problem with valuable assistance in a comprehensive memorandum by Mr. Marsh for the Branch of Research. It is hoped that some contribution can be made (1) to concentrate available government statistical resources on the most needful aspects; (2) to coordinate the work of different agencies and indicate bases of cooperation which will make for the most effective the collection, editing, compilation and interpretation, respectively, of forestry statistics; and (3) help to put onto a stable and continuing basis the resource and certain other economic statistics which by lack of legislative

recognition the Forest Service has only been able to undertake at sporadic intervals, mainly in connection with pressure jobs such as the Forest Crop, Capper or Copeland reports and which has earned for U. S. forestry statistics the reputation of being the worst of all our national statistical data.

-----#-----

CENTRAL STATES FOREST EXPERIMENT STATION

General

Interest in Public Acquisition

Various agencies in Ohio are becoming interested in the possibilities of public ownership of forest and waste lands. On March 6 Baker was invited to confer with members of the recently created State Planning Board, to advise them regarding the establishment and advantages of forest lands under public ownership. They also raised the question of National Forests and an Enabling Act for Ohio. Later in the month Kellogg attended a similar conference composed of members of this Board, the State Forester, legislators, and a committee of the Muskingum Valley Association. They were especially interested in the permanent public ownership and management of the lands acquired around their flood-control reservoirs.

A similar interest in public forest ownership, and a request for National Forests, has recently arisen in Indiana.

Forest Survey Requirements

Under CWA authorization a survey is being made in Ohio and Indiana to determine, for the records of the Lumber Code Authority, the kinds and amounts of wood consumed in 1933 in producing and shipping various products. This project is being supervised by Kellogg, assisted by Parker. Ninety-five wood-using industries in Ohio, and ninety-nine in Indiana, are being visited by experienced lumber salesmen employed for this work. A H. Sparks of Columbus began work in Ohio on March 16, and W. G. Bass of Indianapolis started in Indiana on March 20. This project will be completed early in April.

Branch Stations

A two-weeks' trip of inspection of Branch Stations was made by Baker and Day. On March 11 they attended a meeting of public foresters at Memphis, Tenn. to discuss the supplemental provisions of Article X of the Lumber Code for the hardwood subdivisions. Several days were spent in an inspection of the Sylamore Branch Station in northern Arkansas, and in planning for future work. Except for a few minor buildings, construction work is completed, and Kuenzel is making every effort to finish the forest survey and timber estimate before the leaves start this spring. Timber Stand Improvement work on the Ozark National Forest was inspected with forester Averell. Contacts were made with Supervisor Koen at Russellville, Ark., with Supervisor Bean at Rolla, Mo., and with Supervisor Ball at Harrisburg, Ill. Possible headquarters sites for the proposed Illinois Experimental forest on the Shawnee

Unit were inspected, but no good sites were found on areas now approved for purchase. Mr. Ball agreed to attempt to purchase a suitable site promptly. The Morgan-Monroe experimental area in south-central Indiana, which is being developed with CWA labor under the direction of Day, was also inspected on March 20. Work on boundary-fire lines, roads and trails is almost finished, and a topographic and type map of the area by Sutton is nearing completion. Work has started on the headquarters cabin to be furnished by State Forester Wilcox.

On March 29 Baker conferred with State Forester Secrest at Chillicothe regarding the headquarters buildings which the State Forester is to construct on the Ohio experimental area, Shawnee State Forest. This project will be started soon.

Miscellaneous

The Station has secured an additional 2,000 square feet of floor-space on the third floor of the Horticulture and Forestry Building, directly over the present offices. A room approximately 40' x 50' will be used as a work room and for storage purposes.

Oliver D. Diller, employed by the Station for the past three years as field assistant, has received his Ph.D. degree in forest ecology from Ohio State University. His dissertation was entitled "Some Limiting Factors in the Natural Regeneration of Oak-Hickory Woodlands Following Excessive Grazing."

Dr. Diller and Dr. A. G. Chapman of the Ohio State Botany department have been employed by the Station for ECW research, effective April 1.

With the approach of the third ECW enrollment period, the demands of liaison with the Army has consumed an increasing amount of Kellogg's time. To the Forest Service and the National Park Service has been added the new Soil Erosion Service of the Interior Department as a Using Service in the 5th Corps Area. Three camps (2 in Ohio on the Muskingum Watershed and one in West Virginia) will be established under the jurisdiction of the SES for the 3rd period. R. S. Maddox visited the Station on March 23 to confer with Kellogg on ECW work.

Research

Forest Plantations

The plantation black locust volume table giving contents in board feet (International - 1/8"-5" top), based upon measurements of 218 trees, has been mimeographed as Station Note No. 9 and will be distributed soon. This table was used in the computation of the 254 yield plot tabulations, which have been checked.

With Kellogg's help, Schumacher has completed the table giving contents in board feet (Scribner rule - 8" top), based on 81 trees. In aggregate deviation, the chart is 0.36% low and the average deviation of 74 trees is 12.0%. Tracings for this table are now being made.

Meyer is preparing a merchantable cubic foot table for black locust. Some work has been done on taper tables as opportunity offered during the month.

Forest Sites

Auten has completed the laboratory work on locust and walnut plantation soil samples, and has started statistical analysis of the data.

Farm Woodland Management

The manuscript "Woodland Carrying Capacities and Grazing Injury Studies" by DenUyl and Day has been accepted for publication by the Purdue Agricultural Experiment Station as the second of their cooperative series of "Studies in Indiana Farmwoods."

A revised working plan for the Growth, Yield and Silvicultural Management Phase is being prepared to secure close correlation with the Upland Forest Management Studies (M-3). The proposed development of Experimental areas in Indiana, Ohio, and Illinois will permit investigation into many problems which are common to both projects.

Diller presented a short paper before the Annual Meeting of the Ohio Academy of Science on the effect of the 1930 drouth on the growth of beech in northern Indiana. Based on a limited amount of data, his studies indicated a closer correlation between growth and temperature than between growth and rainfall. He found a high negative correlation between high temperatures and radial growth which he believes is due to excessive transpiration. High temperatures during the month of June apparently have the greatest effect in slowing down growth. Further study of this interesting correlation is contemplated.

Locust Borer Investigation.

On March 1 and 2, Hall and Wilford attended the North Central States Entomologist Annual Meeting, at Lafayette, Indiana. At this meeting, Hall discussed the probable effect which the extensive planting of black locust in erosion control may have on the locust borer problem of the future. He pointed out that this planting program will very likely lead to a decided increase in borer population, and a resultant problem which will be much more serious than any we have had to date.

The period of March 3 to 8 was spent in Illinois examining two areas of black locust which had been clear cut during the spring of 1933 to indude sprouting. Measurements were made on both areas and it was found that the average height growth on the area at Bath was about 6' for the first year. Considerable damage by the locust twig borer was observed on this area and probably resulted in a marked decrease in height growth. Measurements on the area at Jerseyville indicated that the average height of sprouts for the first year was about 12', with an average diameter growth of .7 inch D.B.H. The twig borer was active in this area but did not appear to have influenced height growth to any appreciable extent.

Wilford spent the balance of the month supervising the control experiments at Cambridge, Ohio, and in office work at Columbus. Hall spent the period of March 25 to 31 in Washington, D. C., discussing the progress of the locust borer project and plans for the coming season. He also took part in the conference on the white grub problem, which is to be initiated by the Division of Forest Insects during the coming field season. He also took his locust borer plot data to Washington to have it put on punch cards for use with the Hollerith Tabulating Machine.

When in Washington, Hall discussed the problem of propagating black locust by root cuttings with Mr. Detwiler and Dr. Swingle, of the Bureau of Plant Industry. Dr. Swingle is planning to start experiments on root propagation work immediately and will concentrate his efforts, for the first season, on methods. Hall agreed to supply some cuttings from apparently immune black locust trees in the Central States. Mr. Detwiler indicated that he proposed to have a Long Island Nurseryman supply him with 10,000 sprouts from an apparently immune variety of locust on Long Island. These sprouts will be propagated from root cuttings and will be ready for planting during the 1935 spring season. These trees will be used in experimental plantings in various sections of the country, along with seedling stock, to determine if this variety is truly immune to locust borer injury. Hall will give his full cooperation to this project and will assist in locating areas where these experiment plantings can be made. He will also cooperate in supplying root cuttings from immune trees, from various sections of the region.

-----#-----

LAKE STATES FOREST EXPERIMENT STATION

Planting on Hardwood Land

Survival and growth data on the plantations at Dukes, Michigan have just been worked up by Neetzel. These plantations, from 2 to 6 years old, were established on good hardwood soil in openings and under cover on cut-over land. About 31 per cent of the conifers planted under cover now survive, compared to 88 per cent in the open spots. The losses in the underplantings have been due mainly to depredations of rabbits and rabbit injury has been over five times as great under cover as in the open. Trees in the open at the end of five years were five to six times as high as those under cover.

Obviously, planting conifers under hardwood reproduction is not a paying proposition, but filling in the openings up to about 15 per cent of the total area with planted trees seems to be a successful way of introducing a desirable mixture of conifers.

Windbreaks

Farmers' Bulletin 1405, "The Windbreak as a Farm Asset" by Bates, is again up for reprinting. It is one of the Department's "best sellers" and has been reprinted ten times. Each time from 10,000 to 25,000 copies were issued and the annual demand is still in the neighborhood of 10,000 copies.

Mortality in Northern Hardwoods

The station was represented at the Michigan Academy of Science meetings by Eyre, who presented a paper, "Mortality in Selectively Cut Northern Hardwoods." The exceptionally low mortality and good growth that has resulted in our selection cuttings at Dukes, when from 1/3 to 2/3 of the volume was removed, was a surprise to many of the Michigan faculty whose experience with hardwoods was largely confined to the East. Dean Dana in particular said that cuttings of the kind recommended by the station would have resulted in New England in heavy post-logging decadence, whereas in our stands the annual loss for the past five years from trees which died standing was less than 1/10 of 1 per cent.

Land Use Planning

A meeting between representatives of the Forest Service and the Minnesota Conservation Commission was held to decide which areas should be acquired by the federal government and which by the state. A map prepared largely by the station for the report of the Governor's Land Use Committee served as the basis for the discussion.

Forest Survey

With the $28,000 ECW allotment for the Forest Survey, the station should be able to complete the state of Minnesota. It will also mean undertaking the survey of farmers' woodlots in the southern part of the state. Moreover, a woodlot survey will be initiated in Michigan. Undertaking the survey of woodlots is a pioneering job and will necessitate working out new technique since the regular strip survey method will not entirely fill the bill.

-----#-----

NORTHEASTERN FOREST EXPERIMENT STATION

General

During March Behre made a visit to Williamstown, Mass. to inspect a tract of 1,700 acres which has recently been given to Williams College, and which President Garfield is offering to the Northeastern Forest Experiment Station as an experimental forest. The tract extends from the edge of the village of Williamstown to the crest of the Taconic ridge on the New York and Vermont state lines. A large portion of the area was formerly used for agriculture and pasture, and until recent years the owner of the estate maintained a flock of about 700 sheep.

The tract would lend itself well to studies of the problems associated with the rehabilitation of lands formerly used for agriculture in New England. One especially attractive feature of this tract as an experimental forest is the proximity of Williams College, where laboratory, greenhouse, and photographic facilities would be available.

During the last week of March, Behre, Westveld, and Jensen met with the staff of the White Mountain National Forest to consider the orientation of cultural work to be done by the CCC during the coming year. A day was spent in the field inspecting girdling operations which have been done during the past winter in a number of types. In the future it is proposed to place all the cultural work under the direct supervision of the rangers. It was the consensus of opinion that girdling operations in stands of mature hardwoods should be done very sparingly, if at all. It appeared desirable to line up a more varied cultural program rather than to concentrate so much effort on girdling as had been the case during the past season. It appeared that some of the camps had treated practically all the areas in their territory where girdling operations were clearly called for.

We recommended a careful classification of all the lands on the Forest according to types which would determine the character of treatment required. In this determination of treatment the factors of accessibility and possible market must be taken into consideration, especially with reference to girdling of hardwoods. It should be possible to draw up a set of guiding principles which will give the treatment of each type but it was deemed advisable for the ranger to prepare written instructions for the work to be done on each particular unit. The experiment station emphasized the desirability of doing more intensive work on the more accessible areas rather than scattering effort over a large area of relatively inaccessible country.

Men were engaged to canvass wood-using plants in New Hampshire, Connecticut, and New York, as a part of the wood-use study of the forest survey. Arrangement of the administrative details of this project proved a rather time-consuming job, but matters have finally been worked out and the work is nearing completion.

Gale River Experimental Forest

On March 17 the old field station building on the Gale River Forest was destroyed by fire of unknown origin. Fortunately the loss of experimental data was confined to field records from the inventory of about one-fourth of the Forest.

A topographic survey of a large swamp, which is being drained as a CWA project, was completed. This survey showed clearly that the water level in the swamp had largely been influenced by a fill for the logging railroad which was constructed about 60 years ago. The natural outlet for the drainage at both the north and south ends of the swamp had been blocked by the railroad fill with no proper provision for culverts.

It is thought that the drainage of this swamp may afford an opportunity to settle definitely the controversy as to whether black spruce is a species distinct from red spruce. If the swamp conditions are largely the result of blocking the drainage with the railroad fill, it is possible that the black spruce growth which originated following the logging of the original timber and which may have assumed the black spruce habit as a result of unsatisfactory drainage conditions, may now revert to the typical red spruce habit.

Because of the unfortunate snow and ice conditions, the CWA work during the month was largely directed toward cutting and burning the alder brush from an area in the old burn on the southern part of the Forest. It is proposed to plant the land so cleared this spring after treating the alder stumps with sodium arsenite to prevent sprouting.

Bartlett Experimental Forest

The principal activity at Bartlett during the month was the completion of selective pruning of the pine stands at the north end of the Forest. The work was done in a number of areas to compare the effectiveness of using ladders as opposed to long-handled pruning saws, and to compare using saws with the Porter tree pruners.

-----#-----

NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

The annual meeting of the Region One Investigative Council was held March 6 and 7 for the first time since 1932. Some 30 men attended, representing the usual agencies that have been interested in the past. New attendants included three members of the Montana State College of Agriculture who took an active part in the discussion of range research and economic planning, one representative of a large land holding company in eastern Montana, who volunteered the use of his land and cattle to demonstrate the practicability of certain range research results, and the land agent of the Anaconda Copper Company who expressed his interest in and appreciation of the research progress reported.

Toward the end of March Director Watts made a flying trip to Washington for about a week, stopping at Helena enroute home, to attend a two-day meeting of the Montana State Planning Conference. About 300 representatives from all parts of the State were in attendance. A few expressed the view that there is no reason for alarm but there was a general tendency to face facts and recognize that constructive planning along many lines is essential to meet the situation rather than to drift. Director Linfield of the Montana Agricultural Experiment Station made a statement favoring more intelligent land use and said that this means grazing for many areas where dry farming cannot succeed.

The need for a more adequate inventory of the various State resources, including forests and ranges, was recognized in the rather comprehensive final report and resolutions of the land use section. Adequate financing of these stock-taking jobs was recommended.

A study course in statistical methods, conducted by Jemison and consisting of one lecture a week for a fifteen-week period, was terminated late in March. A great deal of interest was shown by the 16 members of the station staff who attended these lectures. A continuation of the course is contemplated for next winter.

Some of the material covered in this seminar included: frequency distributions and constants, theory of random sampling, goodness of fit, gross correlation, and analysis of variance.

Range Research

Two new Nira appointees from the J.R.E. list, Walter Astle and J. E. Woolfolk, joined the range force late in March. Fred Benson, another appointee, will report for duty early in April. The latter will probably be assigned to a detailed survey of a typical spring-fall range area in the foothills of western Montana, while the first two will spend most of the summer at Miles City.

Some little time was spent in preparing a statement that was presented on March 27 at the State Planning Conference in Helena. Arguments for reducing the present number of livestock units in the State and certain advantages of such a move were pointed out in this statement. The conference report recommended establishment of a range research area such as is mentioned above. This meeting adopted a set of resolutions that involve a very comprehensive program if carried out in full.

Forest Survey - Requirements

Tabulation of data from 430 Montana Rural Housing Survey schedules was completed. The Flathead and Lake County records were tabulated by Whitney at Bozeman. Information covering farm home requirements reported by Agricultural Engineers in four other Montana Counties was copied by a Civil Works employee at Missoula from schedules loaned to this Station by the Montana State College.

From March 7 to 23, through arrangements with the University of Idaho, a Civil Works Administration employee assigned to a similar job at Moscow, Idaho, obtained detailed records for 374 farms reported on by the Agricultural Engineers for Latah, Bannock, Gooding, Gem, Jerome, and Payette Counties in Idaho. Whitney spent two days at Moscow in connection with this work.

In addition to the basic information taken from the Engineer's schedules in Montana and Idaho, summaries showing types of construction, age of houses, new construction contemplated, and other interesting data for 9269 farms visited by Rural Housing Survey Enumerators in these two States have been obtained.

Census

The Idaho-Montana canvass occupied more than half of Whitney's time during the past month. Three hundred and seventy-five completed schedules were forwarded to Washington. On March 28, follow-up requests for census reports were mailed to all delinquents in this region. The returns needed from a number of the concerns to be accounted for will be obtained by Mr. Bradner while calling upon operators in northern Idaho to collect their 1933 manufacturing costs. All clean-up work is being pushed as rapidly as possible and will probably be completed within the next two weeks.

Fire

Some extremely interesting and fundamental relationships between weather and fuel moisture contents have been found in the analysis of 10 years of Priest River Fire-weather records being made by Jemison. Comparisons of clear cut, half cut, and full timbered areas for both morning and afternoon conditions have been studied by means of 384 gross correlations involving 17 weather factors and the moisture contents of four different fuels.

The relative importance of the weather variables on fuel moisture is being investigated in a multiple correlation study. Alinement charts, based on the combination of a few such weather elements that will yield fuel moisture estimates of greatest accuracy, are to be prepared.

A preliminary study, using the records of the clear cut station, indicates that afternoon duff moisture can be estimated with satisfactory accuracy from measurements of morning duff moisture, air temperature, and relative humidity.

Analysis of other fire-weather measurements have been largely completed. These include:

(1) The checking of relative humidity computations and the compilation of temperature, humidity, and precipitation data for eight stations, from beginning of the station record to date. These summaries by 10-day periods will be distributed to the respective stations to provide them with normals and extremes to compare with current measurements.

(2) The preparation by Gisborne of a manual "The Measurement of Fire-Weather and Forest Inflammability" for use at our half-hundred weather and inflammability stations.

(3) The coding of the lightning storm reports for Region 1. With the inclusion of these records for 1933 we now have comparable data covering 10 consecutive years. A summarizing report should be prepared next winter.

(4) The coding of the Region 1 fire reports, Form 929. This work this year required less time than ever before, due to the assignment of Ranger G. W. Case who had learned the method last year.

(5) The compilation of regional rain maps for June, July, and August, 1933, showing the area affected by each "good rain" of 0.20 inches or more. These maps are based on reports from over 350 rain gauges very well distributed throughout northern Idaho and western Montana. The maps show clearly the local character of our summer rains. Of 16 "good rains" occurring at one or more stations, not one covered all the fire Forests, and only 4 covered a majority of these Forests. Differences between individual stations were great, one station receiving nine good rains while some received only two. Pronounced and significant differences also were found even within a single National Forest. On the Coeur d'Alene, for example, one station benefited from seven rains of 0.20 inches or more.

while another station received only two. The existence of such conditions indicates the opportunity of reducing the protective force in the wet areas in order to strengthen the force where drouth is becoming dangerous. Prompt posting of rain maps is advocated in order to reveal the existence of such opportunities to attain more efficient fire control at less cost.

Other progress in fire research includes, (1) the ordering of seven fuel hygrographs which will be used to study the development of fire danger on north versus south slopes by altitude, (2) the redesign of the Schick, knock-down, fire-weather instrument shelter, to eliminate certain undesirable features, to lower the cost, and to facilitate assembly in the field, (3) the call for bids for a 150 foot steel tower to replace our high-tree anemometer exposure which, because of decay in the top, had to be shortened last year to 135 feet. The new tower will also permit meteorological measurements at various levels from ground, through the forest canopy, to well above it.

At Priest River, our big moment occurred on the 26th, when the new 11,500 volt electric power line from Priest River to the station was energized, made hot, or in other words, the juice was turned on. For the first time, this made electric light, heat and power available at our Priest River Station.

-----#-----

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

The Forest Research Council of the Pacific Northwest met on March 14 in the new assembly hall of the Station. Sixteen members or representatives of members who were unable to attend were at hand to listen to brief summary reports of the major projects and to offer their counsel in the further conduct of these projects. A. R. Watzek, Hugo Winkenwerder and T. T. Munger were reappointed in their capacities as chairman, vice chairman, and secretary of the Council, respectively. Methods of making the results of the forest survey available in the most suitable form received careful attention, and suggestions were entertained to present the statistics by sustained yield units, which would have to be carefully outlined by taking all factors, economic and otherwise into consideration. In regard to the abandoned land study, the sentiment appeared to be that the data already collected (18 sample counties) should be followed through before new areas were taken up. So far, attention has been given to determining the situation. The next steps are to determine the causes and then to find the remedies. The advantages of selective logging and the methods of its conduct were thought especially significant in view of the fact that Article X of the Lumber Code places much emphasis upon partial cutting. During the coming summer the study will be extended to the pine region, where the proper type of machinery is already generally adopted. Silvicultural research, as suggested by Colonel Greeley, should help in drafting a handbook for loggers and lumbermen, aimed probably at the camp foreman upon whom the responsibility will rest to secure proper forestry measures. Apparently there is considerable variation of opinion as to what "sustained yield" really means, it often being considered something which one can see by going through a logging area, instead of an economic set-up which can be more closely observed in the office.

Council members were particularly interested in the display of instruments recently developed by the fire study staff for the purpose of measuring various fire weather factors, visibility, and fuel inflammability. In connection with the insurance study, interesting questions were raised as to whether under the Code a logging company could not carry insurance and charge this as an operating cost. The report on entomological studies provoked a discussion on the relation of slash burning to insect attacks.

Mr. Manning of British Columbia gave a concise picture of research efforts in his province.

Munger and Andrews spoke at the meetings of the Pacific Northwest Regional Planning Conference held under the auspices of the Pacific Northwest Regional Planning Commission, comprising representatives of the Planning Commissions of the States of Washington, Oregon, Idaho and Montana and the PWA State Advisory Boards of these states. Munger addressed the land use section on the problems of forest land ownership and use. Andrews spoke to the land use section on the inventorying of certain physical data necessary to determine best land uses, particularly the mapping of forest and other land use types. He also addressed the section of industries, commerce and economics on the timber resources of the Douglas fir region, explaining the forest survey data which are available and indicating the uses to which these data should be put.

Activities in connection with the development of woods practice rules under Article X of the Lumber Code have occupied a very large part of the Director's time during the month, and have also required considerable attention by other members of the staff. As an advisory member of the local committee, Munger attended meetings in Spokane and Portland in connection with the application of Article X to the ponderosa pine type. Munger and McArdle attended in an advisory capacity similar meetings for the Douglas fir region at Portland, Eugene and Marshfield. Frequent consultations have been held with representatives of the lumber industry to assist in developing specific plans, and the technical information available at the Station is being used at a constantly increasing rate.

The buildings at the Wind River Experimental Forest are now being entirely renovated by CCC labor, and a large garage and storage house is under construction. Water pipes have been laid in the arboretum, and a road opening up the Panther Creek Division has been surveyed and will be built within the next few months.

The survey of the proposed experimental forest at Cascade Head is well under way. All basic control has been run and the field parties are now mapping and cruising the area.

Section of Silviculture

Fire Studies

In preparation for the fire depletion study for the forest survey of eastern Oregon, several hundred fire reports for eastern Oregon counties were copied. These reports will be taken into the field for checking.

The weather, fuel inflammability, and visibility instruments being developed by the Station are causing increasing interest. These instruments are being made for the Regional Office with the idea that they will be used for administrative check-up of weather and fuel conditions on the national forests. On some forests, as many as three stations may be established on a single ranger district in order to cover the wide range in weather and fuel conditions occurring in this region. The records will not be used for weather forecast purposes. Each station will consist of a weather shelter, a wind gauge, wind vane, rain gauge, thermometer, and either a hygrometer or one of the new type of psychrometers now being developed. All stations will have hazard indicator sticks to estimate current fuel inflammability. Stations at lookouts will, in addition, be equipped with a visibility meter.

The new state law for Oregon provides that logging operations must close down on order of the State Forester during the fire season. It also provides that logging operators must purchase hazard indicating equipment as ordered by the State Forester, provided the cost of this equipment does not exceed $25. The Lumber Code for the Douglas fir region has a similar provision. For this reason the private and state organizations are also interested in the weather and fuel inflammability instruments being developed here. Final designs have not yet been completed, but it is very probable that we can design a set of instruments which can be manufactured for not to exceed $25 and which will serve the purpose for which they are intended. Complete information on this equipment will be sent other stations as soon as possible.

Douglas Fir Silviculture

During the month Isaac divided his time between the preparation of his bulletin on Douglas fir natural regeneration, reviewing his manuscript on influence of environmental factors on seedling establishment, and in the preparation of a manuscript for publication on the influence of slash burning on Douglas fir forest soils, which he is working up jointly with Howard G. Hopkins.

The soil study indicated that the duff layer on an acre contained approximately 28 tons of organic matter, 590 pounds of nitrogen, 75 pounds of calcium, and 120 pounds of potassium. The slash fire was found to change the soil reaction from acid to alkaline, and to increase the concentration of available mineral nutrients in what was left of the duff layer. Most of the nitrogen, however, was driven off; the total amount of phosphorus, calcium, and potassium present was reduced, and most of the organic matter consumed. The destruction of organic matter reduced the moisture holding capacity of the soil, and destroyed the storehouse in which plant food is made available through microbial activity.

In the reproduction studies, the records from seed traps on the Wind River Natural Area (representing the Douglas fir type) give some interesting information on the actual seed fall per acre under virgin stands. During 1932, when there was a medium crop of hemlock and light crop of other species, the seed fall per acre was at the rate of 4,000,000 hemlock and 150,000 Douglas fir, and 50,000 cedar and true firs. During 1933, when there was a light crop of all species, the fall per acre was 200,000 hemlock and 10,000 of other species.

Morris spent most of the month revising a manuscript which gives the results obtained to date in the Douglas fir heredity study.

This year's outplanting in the arboretum by Isaac and Kolbe boosted our total number of species under test from 147 to 167, and the total number of tree specimens to about 1700. In this collection we now have 49 different pines, 7 larches, 13 spruces, 20 balsam firs, and various other conifers, such as hemlocks, cedars of several genera, junipers, and the like. The prize trees in the collection are two native species, namely, the rare alpine larch (Larix lyallii) and the little known weeping spruce (Picea breweriana). We are also rather proud to have specimens of the hybrid Dunkeld larch, and a dwarfed Gerard's pine from India, as well as others.

Section of Forest Products

General

Among the requests answered during the month have been (1) the use of western hemlock bark as a source of tannin, (2) the destructive distillation of Douglas fir stump wood, (3) the methods of preventing sap stain during cargo shipment, and (4) the strength allowances in floor joists.

Information was supplied as to type of construction necessary to insure freedom from danger of dry rot in farm building construction.

Information was compiled for the Regional Office as to number of loggers by districts in western Oregon and Washington.

Lumber and Log Census

Johnson devoted practically the entire month to editing schedules and to other necessary work relative to the Census. To date 1332 completed schedules have been forwarded to Washington, 770 in March. Third requests and form letters were sent out to companies from whom no reply had been received, 370 in Oregon and 425 in Washington. Also 50 special and registered letters were mailed.

Wood-using Industry Survey

Upon the request of the Forester, a survey of the 1933 wood and lumber requirements of selected industries is being made. Forty-seven in Oregon and 70 in Washington are to be contacted for the desired information. This work will be combined with the check-up of census delinquents in so far as this is feasible. All but nine of the Oregon questionnaires were completed during March.

Forest Survey-Rural Requirements

A few days were spent in compiling the data on farm fences obtained at the Federal Land Bank in Spokane last month. This work was side-tracked before completion because of the urgency of census and wood-industry check-ups.

Log Exports

Additional data on log and minor products exports and minor products price trends were secured during the month.

Selective Logging in Ponderosa Pine

Rapraeger continued to work with Brandstrom during the month on various phases of the selective logging studies, and they jointly prepared a preliminary working plan for the study in ponderosa pine. This project was approved by the Forest Research Council at the March 1934 session, and may be inaugurated this field season.

Mensuration

The chief mensurational activities have been the completion of Sitka spruce volume tables for the new yield study, and of second growth ponderosa pine volume tables for the range-wide yield study of this species. The tables were applied immediately to the existent plot data, and all plot computations brought up to date. No more work will be done in either yield study until the missing plot data are taken in the field.

Growth predictions for the forest survey have also taken up much time. Calculations are complete on about eleven million acres, with approximately five million more acres in the assembly stage. Although the final growth totals will be published only for major units of several counties, the method of assembling and calculation permits resumming by any desired group of ownerships and counties if need for this arises.

Forest Insurance

The completion of the generalized cover type map of western Oregon required two weeks longer than was estimated in the report for February. This was due to the great detail in the southern portion which caused the work to go more slowly than the rest of the map had gone.

When the work originally laid out had been completed, it was decided to fill out the space that had been left immediately west of the crest of the Cascades (on the national forests) and Hood River County. This portion had not been colored in because it was not of particular interest to the insurance study. Doing this, which completed the map in so far as the forest survey has progressed, required most of the remainder of the month. The balance of the time was used in doing the same work for northwestern Washington. This really ceased being a forest insurance project about March 20.

During March the integration and rate schedule construction for the ponderosa pine and sugar pine regions was completed. Tentatively suggested schedules for these two regions are now ready for review and bringing to final form. It is not believed that any material modifications will be indicated.

Some of the time available in March was devoted to interviews with financial men here in Portland for the purpose of getting indications of the possibilities with respect to promotion. A true indication of the forest credit aspects of insurance is needed. These interviews are helpful as a means of estimating this phase of the project.

One Scandinavian forest insurance company has replied to our inquiry. Translation of this reply, voluminous, has been completed.

Forest Economics

Selective Logging in Douglas Fir

Brandstrom completed an office report entitled "A Report on Proposed Experimental Timber Sale at Wind River", giving a detailed appraisal and logging plan for a 1000-acre area of national forest timber, with a generalized plan for application to a larger area to be managed for sustained yield.

Part of Brandstrom's time was devoted to work on Part II in preparation for his detail to Washington next month.

Rapraeger continued work on the study of stumpage value increase in Douglas fir.

New Public Domain

Compilation of data on tax delinquent and publicly owned lands was completed for four counties, namely, Whatcom, Columbia, Lane and Lincoln; 1-inch-to-the-mile maps were completed for Douglas, Columbia, and Thurston Counties. All statistical compilations on tax delinquent and publicly owned lands are now complete for the 18 counties included in the survey. The map of Lane County is yet to be completed.

Acreage data are prepared by classes of intent in ownership and year of tax delinquency for Wahkiakum, Coos, Jefferson, and Clallam Counties, the latter three being completed in March.

Additional field data on approximately 6,000 acres of land in Columbia County were secured and incorporated with the original field data for that county.

Computation of percentages of collections on levies, covering a period of 10 years, has been completed for several of the taxing districts in each of the following counties: Grays Harbor, Jefferson, Clallam, Wahkiakum, and Whatcom.

A table showing the number of persons gainfully employed in the various industries, and showing the percentage of those employed in forestry and related industries to the total of all industries, has been completed for the 18 counties covered by the NPD survey.

A compilation showing trends of assessed values and warrant and bonded indebtedness for a 10-year period for each of the taxing districts of Clatsop County has been completed.

Forest Survey

The compilation of type and volume data for the Douglas fir region has been finally completed. The county inventory statistics consisting of a set of five tables and three charts for each county have been completed for 37 of the 38 counties in the region. Stencils have been cut for all the tables for the Washington counties, and they have been mimeographed, assembled and are now ready for distribution. The tables for the Oregon counties will be completed and made ready for distribution within about a week's time.

This job has involved the planning, checking and proof-reading of 228 large tables of statistics and graphs. Including the explanatory foreword and title pages, 273 stencils were cut and over 40,000 sheets have been mimeographed, folded and bound, all work being done on Station machinery largely with CWA help.

A start has been made on the collection of cruise data for the ponderosa pine region. All the cruise data for the Klamath Indian Reservation, Warm Springs Indian Reservation, the Lake County cruise, the Deschutes National Forest, and the Fremont National Forest have been transcribed to our section assembly sheets. The type maps and cut-over maps of the Klamath Indian Reservation have been copied.

Girard arrived the latter part of March and, with the assistance of the type mappers and timber experts, will classify the volume statistics of the Douglas fir region according to accessibility zones.

One-inch-to-the-mile detailed type maps have been completed for six counties and four national forests. This job should be completed in about six weeks, provided the same amount of CWA help now at work is made available to that time.

-----#-----

SOUTHERN FOREST EXPERIMENT STATION

Forestation

Wakeley and Huberman laid out the first of a series of preliminary tests in the Catahoula Nursery, on the Kisatchie National Forest, to answer the most pressing questions of the men in charge and to obtain data for the working plan covering the next five or ten years' studies. The nursery has an assumed annual capacity of ten million trees. The immediate problems are (1) to increase germination and initial survival sufficiently to double the tree per cent usually obtained (probably by improving seed bed or cover condition); (2) to learn the relative qualities of the various soil types in the nursery (by sowing matched samples of seed at intervals throughout the area and maintaining the beds at constant density); (3) to obtain preliminary data concerning the effect, in this nursery, of density, shading, zinc sulphate weeding, and root-pruning in place; and (4) to get a more complete picture than has ever before been obtained of the entire history of individual seeds and seedlings under ordinary treatment, from the day of sowing until lifting.

The work so far involves repeated counts and measurements in approximately 100 one-foot-square plots representative of an equal number of 4 x 4 foot subdivisions treated in various ways. Each treatment is replicated four times. Additional treatments and plats will be installed as the season progresses. Future work will probably consist principally of a series of beds managed under a definite program for five years or more to build up and maintain soil fertility, as deterioration under constant cropping is one of the most serious and least studied problems in southern pine nurseries.

Ecology

Pessin has completed a progress report on the competition-density studies at Bogalusa, Louisiana. Fifteen plots were established in 1932 in a stand of 12-year-old longleaf pine seedlings. The stands were thinned to densities of 100, 50, 25, 15, 10, 5, and 1 thousand seedlings per acre. Seven plots were denuded removing all vegetation but the pines, in seven plots all oaks were removed but the grass left undisturbed, and in one plot neither the grass nor the scrub oak were disturbed and the pines thinned to 5,000 per acre density. In one growing season after establishment (1933) a marked correlation was evident between the rate of growth, the density, the stand and the character of the ground cover. The per cent increase in height growth on each plot is shown in the following table:

Density per acre	Denuded plots	Undenuded plots
Number	Per cent	Per cent
1,000	456	64
5,000	115	46
10,000	79	33
15,000	56	31
25,000	57	23
50,000	15	27
100,000	25	18
5,000 oak plot	--	0

Financial Aspects of Private Forestry

R. R. Reynolds has been awarded a Pack Fellowship, effective June 1st, and will study selective logging of second-growth stands of shortleaf and loblolly pine. The study is a cooperative project between the Charles Lathrop Pack Forest Education Board and the Southern Station, and will be carried out in southern Arkansas. Reynolds has just completed an intensive inventory of second-growth and virgin pine stands on the holdings of the Crossett Lumber Company and has also marked these stands for selective cutting. Much of the selective logging study can be made in these stands.

A. R. Spillers, who is now with the Tennessee Valley Authority, spent March at New Orleans. Spillers had charge of the field work of the study of

land use for forests in the lower Piedmont region of Georgia before he left the Service. The report shows that for a typical county the forests occupy 60 per cent of the total area but an additional 13 per cent is in idle land or area cut clean of forests. Of the total forest area about 70 per cent is in old-field pine stands. Most of the stands are understocked and the quality is rather poor. The best stocked stands are growing over 500 board feet per acre per year in trees over 9 inches d.b.h. The average farm has a total area of about 300 acres with about 200 acres in forests. At present stumpage prices of $2.50 per thousand board feet for pine and $2.00 per thousand board feet for hardwoods, the value of the actual annual increment that can be cut in trees over 12 inches d.b.h. totals $50.71 per farm. In addition 18 cords of fuelwood and 100 fence posts can be cut annually from thinnings and improvement cuttings. Taxes amount to about 12 cents per acre. The yields from the better stocked stands indicate that the income from the farm woodland can be greatly increased if all stands are built up to better stocking.

Forest Survey

Eldredge spent two weeks in the Southeast inspecting the work of Lehrbas and his survey assistants. During this time he approved a working plan for a study to determine the rate of growth of longleaf and slash pine trees during the period in which they are being worked for naval stores. He also approved a pole study by means of which the inventory of pole supplies can be broken down into the grades recommended by the American Standards Association.

Three crews started field survey work in the Norris Dam watershed of the Tennessee Valley Authority. On this area the regular procedure has been modified somewhat to furnish information desired by the Tennessee Valley Authority. For example, survey plots are made permanent and are marked with a metal marker to enable complete remeasurements by the Tennessee Valley Authority. Also, lines are run at 5-mile intervals instead of the 10-mile intervals used elsewhere in the Survey.

The personnel of the computing section, under the direction of P. R. Wheeler, was increased by the addition of four computing clerks, one tabulating machine operator, and one key punch operator, bringing the computing force up to a total of eight persons. Arrangements were made for installing mechanical sorting and tabulating machine equipment. The rental of this equipment was made necessary to complete concurrently the computing work associated with the field data which are coming into the office at the rate of approximately four million acres a month. The sorting and tabulating equipment is used, according to a plan prepared by Wheeler, in the mechanical calculation of timber volumes and preparation of forest stand tables. Also, by using this equipment rates of growth are summarized and timber volumes by log grade and land area within release unit by given land classes are apportioned. According to estimates, approximately 500,000 tabulating machine cards will have to be prepared for the 47 million acres of land in the active naval stores belt of the Southeast. Based on a conservative estimate, the present force of computers with the aid of tabulating machine equipment can complete the analysis work for 47 million acres in 12 months. According to our past experiences with manual analysis of similar data, this

volume of work would require the services of 8 computers for a period of 48 months if the mechanical equipment were not available.

Forest Pathology

Arrangements have been made by Siggers to conduct tests on the control of nursery diseases of black locust seedlings. This work is planned in cooperation with state agencies on their forest tree nurseries in Louisiana and Mississippi, and will start in April, 1934.

A small plantation of longleaf pine seedlings was set out near Bogalusa, Louisiana, to be used in tests to determine the minimum treatments necessary to control brown spot and which will result in early height growth of seedlings.

----#----

SOUTHWESTERN FOREST AND RANGE EXPERIMENT STATION

The annual meeting of the Regional Investigative Committee was held in the Regional Office January 30-31.

A Lumber Code conference was held in Albuquerque March 8 and 9. The director of the experiment station was one of the Region 3 representatives of the committee on rules of forest practice. The lumbermen agreed to a set of rules, which, though falling short of what a forester would desire, nevertheless meet the primary requirements for preserving the private forests of this region. It developed in a preceding conference that practically none of the operators in Region 3 are cutting on their own land, and that their contracts call for removing all the merchantable timber. Under these circumstances, and knowing that private forestry will not pay in the Southwest, Forest Service representatives felt that the maximum objective that could be hoped for was acceptance of provisions that would keep the lands from being devastated until such time as they can be acquired by the Government. The main provisions of the adopted rules are summarized as follows:

1. Fire Protection - Use of oil or gasoline for fuel; establishment of 50-foot fire lines around blocks not exceeding 160 acres; cooperation with the Forest Service in fire detection and suppression.

2. Conservation of young timber - Avoidance of unnecessary damage to advance reproduction and reserved trees in logging operations.

3. Selective cutting - On areas cut for saw timber, leave all trees below 12 inches, d.b.h. and not less than two seed trees per acre, or in lieu of the above, not less than 10 per cent of the gross initial volume. Seed trees shall be not less than 17 inches d.b.h., wind firm, of good crowns, but not necessarily of high merchantability. White fir is not acceptable as a seed tree. On areas cut for a combination of saw timber and stulls, hewn ties and mine props, leave all trees below 8 inches d.b.h. and not less than four seed trees per acre as above defined; provided that trees down to 6 inches d.b.h. may be taken from thick stands on a thinning basis. Any recut must leave a stand equivalent to the above specifications.

In view of the fact that the bulk of the privately-owned timber lands in Region 3 are in sections where conditions are favorable to natural reproduction, it is believed that the foregoing provisions will preserve fairly satisfactory forest conditions even though yields will necessarily be low on account of deficient growing stock. It was sought to include a provision to regulate grazing, but it was found that this could not be done because the code deals only with the operator and not with the land owner; moreover, the code deals with the operator as a timber operator and not as a stockman.

Good progress is being made in preparing reports in Range Investigations and Erosion-Streamflow, under the editorial direction of Dr. W. W. Weir, formerly of the Bureau of Soils.

C. J. Whitfield, Ecologist in Erosion-Streamflow, resigned in December to accept a position as director of range investigations at the newly created Navajo experiment station of the Soil Erosion Service.

Sample Plot Records

As soon as the past year's remeasurements are compiled, they will be combined with other 20-year records to form a yield table for many-aged cutover ponderosa pine. A preliminary table of this type based on 100 one-acre plots was prepared a year ago. The new table will include 500 one-acre plots.

Cloudcroft Branch Station

The study of natural reproduction of Douglas fir, begun by Krauch in 1932, has been carried through two seasons and will be continued through 1934. In order to eliminate as many variables as possible, seed was sown on parallel series of plots representing different degrees of natural and artificial shade, with and without rodent protection, and with and without protection against livestock. Sowings in June 1932 produced large numbers of seedlings under nearly all conditions where protected against rodents, but few or none where rodents had access. Livestock did not appear to be an adverse factor of great importance. The sowings were repeated in October 1932, germinating the following June and July, with results similar to those of the first sowing. Rodents appeared everywhere to be the dominant factor.

This study was undertaken because of disappointing results on Forest Service cuttings where seed trees and fire protection were provided. Examinations of older private cuttings, often burned and generally grown up to aspen, oak or other broadleaved trees, have shown that despite a paucity of seed trees, seedlings are starting better than on Forest Service cuttings. The time element is a factor, but there appears to be another more important one.

In 1933 Dr. Walter P. Taylor of the Biological Survey found that small seed eating rodents are much more abundant on more or less open cutover areas than in aspen and oak thickets or in uncut forests. Traps put out in October, the number being equal on different sites, gave results as follows:

	Number of animals caught	
	Deer mice	Meadow mice
Uncut Douglas fir	7	1
Scattered Seed Tree cutting	13	23
Aspen thickets	2	1

These results support more extensive observations that mice are most numerous on cutover areas where there is an abundance of herbaceous vegetation, logs and brush. Besides finding less food and shelter in dense stands of trees, the rodents evidently are not fond of the shade. If further experimental work supports the above findings, the solution of the Douglas fir reproduction problem would appear to be in light cutting accompanied by complete slash disposal, moderate grazing, and encouragement of aspen, oak and other broadleaved trees or shrubs in openings. Under certain conditions it might even be advisable to clear cut, except for leaving large seed trees, and burn.

Parker Creek Branch Station

In December 1932, a series of six small lysimeters was installed at the Parker Creek Experiment Station.

Each lysimeter consists of a block of soil 16" by 31-1/4", 22" deep, supporting vegetation. This has been inserted into an iron box made of 10 gauge steel plate. The ground surface (500 square inches in area, measured on horizontal projection) slopes at an angle of 25 per cent and there is an opening at the front of the box which allows surface water to drain off into a small covered silt box. Surface runoff and percolation at 22 inches depth are collected in separate containers.

The blocks of soil were removed intact by pounding down into the ground a steel sleeve slightly smaller than the box. As the sleeve is pushed down, a trench is dug around the edges. When it is down the required depth, the block of soil is undercut and a steel plate is shoved beneath it. The sleeve containing the soil is then raised with block and tackle, the bottom plate is removed and the soil block is transferred from the sleeve to the box.

The soil was taken from grassland on the west slope of the Sierra Ancha Mountains at an elevation of 4500 feet. It is a dark brown clay loam with many small quartzite fragments in the upper 12 inches. It grades into a light colored red clay subsoil with larger quartzite rocks. A few small diabase rocks are also found in the soil.

Rainfall is measured with a standard U.S.W.B. rain gauge and an inclined trough gauge (developed by the California Forest Experiment Station) 4 inches wide and 56 inches long with an adjustable cover on the end whereby the length of the opening can be increased or decreased according to the per cent of slope to give a horizontal area of 200 square inches. This particular gauge was placed 6 inches above the ground surface and on a 25 per cent slope; rain water is collected in a tin container. Intensities of rainfall are measured with a recording tipping bucket gauge.

Records on rainfall and surface run-off were taken soon after each storm. Silt was measured following storms which resulted in noticeable soil erosion.

Results from the 1933 summer and early fall storms - June to October inclusive - are especially interesting because of the relation of soil erosion and run-off to character and density of herbaceous cover.

The readings for 26 storms, ranging in character from light showers to hard rains (with a total precipitation of 13.84 inches) for individual lysimeters are:

Number Lysimeter	Per cent of surface covered by vegetation	Surface runoff in per cent of precipitation	Soil eroded in cubic inches
1	Side-oats grama 12.3%	39.4	28.4
2	Side-oats grama 14.3%	47.5	30.6
3	Side-oats grama 33.1%	33.5	17.9
4	Side-oats grama 29.5%	32.1	14.9
5	Snakeweed and small amount of side-oats 17.1%	49.2	50.7
6	Snakeweed and small amount of side-oats 18.4%	41.0	44.6

The run-off results have a significant bearing on a number of problems vitally related to maintenance of range vegetation which prevents excessive soil erosion.

Precipitation is the principal factor governing vegetation in semiarid regions. There are two seasons of precipitation annually in the district concerned, one in mid-summer, the other in winter. Spring and fall are dry seasons. Summer rains are local in area of occurrence and frequently torrential in character, while the rains of winter are general and are characterized by low intensity of fall.

Surface run-off from the lysimeters has been much greater in summer than in winter. No more than a few drops of water from summer rain fall has percolated through the 22-inch soil depth of any lysimeter and that was from the two having the greatest density of grass cover. Notwithstanding, the fact that one six inch rain fall, which occurred over a 3-day period, has been recorded. Percolation from winter precipitation has been as great as 30 per cent of the amount of a single storm.

Shrubs and grasses are the principal ground cover of the district. As compared with grasses-shrubs are deep rooted. Most shrubs make their main annual growth from winter moisture, while grasses grow principally and mature during the period of summer rainfall.

Rainfall during the summer of 1933 was abnormal in that heavy rains occurred in late June, when rainfall usually is not had, while July and early

August, the months of highest average rainfall, were dry. During dry periods grasses in the lysimeters having the least amount of grass cover, where the greatest run-off has occurred, have wilted and suffered most from drought. This is characteristic of dry periods of dry years when the balance between the supply of moisture and the amounts required for plant growth is critical. If a large part of the rainfall escapes a surface run-off, the ground moisture supply may be insufficient to maintain plant growth. The relationship of surface run-off to plant cover explains why deteriorated vegetation on overgrazed ranges shrinks so greatly during dry years.

The data in the table also indicates a relationship between amount and character of ground cover and run-off. Average run-off from lysimeters 1, and 2 which have a 13.3% ground cover of grasses is greater than that from 3 and 4 which have a 31.3% grass cover. A similar comparison (lysimeters 1 and 2 compared with 5 and 6), (which involves composition as well as density of ground cover) shows that a greater run-off occurred with a 17.7% cover of snake weed and some grass than with the 13.3% cover of grasses.

The data given shows a clearer relationship of vegetation to soil erosion than of vegetation to run-off. This would be expected since the measurements of run-off are for volume only and although run-off intensity is probably greatest on the surfaces with less cover this has not been measured. Silt eroded from lysimeters 1 and 2 which a fair grass cover is 80% greater than that from 3 and 4 which have a good grass cover, but it is less than from 5 and 6 which have a slightly greater cover composed of snake weed and some grass.

Santa Rita Experimental Range

Range and Climatic Conditions

Rainfall on the Santa Rita during the past year (October 1932 to September 1933) was considerably below normal with most of the deficiency occurring during the spring and summer seasons. Winter precipitation (October to January) was 20 per cent above average. Spring precipitation was only 20 per cent of the average, while summer rainfall amounted to but 87 per cent of average. Contrary to the general rule very much deficiencies occurred in the foothill type at the higher elevations with the result that forage production on most of the best grassed portion of the range was about 70 per cent of average. The current dry winter and spring has not helped the situation at all. On the Experimental Range cattle are still in good condition and should come through without any serious hardship. The process of moving some of the older cows into reserved pastures was started several weeks ago and will be continued through the spring. From present indications there will be no need for supplemental feeding of any cattle unless summer rains are unusually late. Range conditions throughout most of Southern Arizona are serious with shortage of both forage and water and considerable losses from poverty already recorded.

Early in the month Messrs. Elliot, Smith, and Fish brought a group of Indian cattlemen out to the Santa Rita and spent a day going over various phases of cattle and range management, preparatory to initiating a range and

cattle management program on the Reservation at Sells, Arizona. Many of the Indian cattlemen exhibited considerable interest in our fencing of the range into pastures and areas of reserve feed, as well as in the development of water and the storage of large supplies in tanks.

Rodent Control

The rodent control work being done by the U. S. Biological Survey has been about two thirds completed in-so-far as poisoning of the smaller rodents is concerned, and Mercer (the local representative of the Survey in charge of the project) expects this phase to be completed by the early part of June. He will then concentrate on control of Jackrabbits through the summer with occasional follow-up work on other rodents wherever it may seem necessary. Shooting of Jackrabbits has so far been more or less incidental to other work, however, with approximately 3500 accounted for to date, the total bids fair to run above the ten thousand mark which represented the minimum guess of several made at the time the work started last winter.

Poisonous Plant Investigations

Poisonous plant investigations at the Santa Rita Experimental Range are well under way. Burroweed (Aplopappus hartwegi), snakeweed (Gutierrezia sarothrae), Sheep loco (Astragalus nothoxys), and barestem larkspur (Delphinium scaposum) are being studied with varying degrees of intensity. Study plots have been laid out for determining the effect of various methods of control or eradication of burroweed in the principal forage types on the reserve. These methods include burning, grubbing, spraying, and various types of management. A general ecological study of the plant (including frequency indices and correlation between soil and climate), root studies, and germination and mortality of seedlings is also under way. The effect of different intensities of grazing on snakeweed is being observed and studied. Studies on loco and larkspur could not be initiated as soon as upon the other species, consequently work on them has not progressed beyond the observational stages.

Jornada Experimental Range

Range & Climatic Conditions:

Conditions remained dry on the Jornada until March 24 when slightly more than a half inch rainfall was registered at most of the gauges. Cattle continue holding up well and there is yet no indication of an emergency.

Range Survey:

In addition to the more pertinent data of the survey, members of the party report a remarkable increase in the number of deer since 1926, when the Jornada was closed to hunting at which time it is reported it was a rare occasion to see one of the animals. It is estimated that the present herd on the Jornada, numbers over 700 head. The party also reports some porcupine infestation--the first official report of their presence on the Jornada.

The work accomplished during March includes the establishment and construction of two rodent exclosures. The first one, 300 x 300 feet, is in the mesquite sand hill type in Major enclosure No. 2, and its size is 80 x 80 feet. The fence construction consists of No. 3 hardware cloth topped by an 8 inch strip of valley steel and 3 strands of barbed wire. The steel is nailed to an 8 inch white pine board to add stability. Posts were set eight feet apart.

The scheduled monthly plantings of black grama, at four feet interval, will be made before the end of the month and additional planting is anticipated.

Poison Plant Eradication

Within the Drymaria enclosure planting of grasses was continued. One plot each of transplants at 2 ft. interval and 5 ft. interval in moisture conservation pits of these grasses were established: Bouteloua curtipendula, Hilaria mutica, Panicum obtusum, and Sporobolus auriculatus. In one plot Sporobolus auriculatus seed was planted in moisture conservation pits. Thirteen additional plots were staked out and a rabbit proof fence enclosing .74 acres was constructed. Just outside the enclosure Scleropogon brevifolius was transplanted in two plots, at 2 ft. and 4 ft. intervals. Half acre plots of moisture conservation pits were established at 5 ft. and 10 ft. intervals. On one flat dams were made to aid in conserving water.

A 20 acre area of Senecio longilobus was surveyed and divided into chain square plots for experiments in methods of eradication. In an area of Actinea odorata 11 plots, each 33 ft. square, were established. Sixteen plots of Asclepias galioides 16-1/2 ft. square were located.

E.C.W. Activity

The telephone line was completed to headquarters and by the end of the month the maintenance work on the Jornada Trail will be completed. Considerable landscaping work has been done around headquarters which with the removal of the assorted shacks and corrals, which used to be squarely in front of the quarters, greatly improves the appearance of the place.

-----#-----

REGION 2

Thinning in Lodgepole Pine, Bighorn Forest (Mt-103)

Most of Loring's time was spent in transcribing and compiling the field data obtained at the time of the establishment of Blocks A and B in 1927 and during the remeasurement of last October, when a complete check-up of the experimental plots was made by Research. Block A is located in a dense stand of thirty-five year old saplings, and Block B in an old pole stand, growth in which had largely ceased at the time of thinning. Both

experimental blocks include three plots, one of which in each was left unthinned. In the sapling stand, the other two represent thinnings to spacing distances of 8 x 8 feet and 10 x 10 feet respectively, and in the pole stand to distances of 12 x 12 feet and 15 x 15 feet.

The results for Block B in the old pole stand are briefly summarized as follows:

No. of plot	Character of Treatment	Number of Trees in 1927 (per acre)	Diameter Growth per annum 1927-1933 (inches)	Increment cu. ft. 1927-1933 Net	Gross
2	Unthinned	932	.0127	-66.26	11.55
1	Thinned to 12 x 12'	309	.0207	-10.54	13.56
3	Thinned to 15 x 15'	208	.0253	-31.12	11.07

Losses during the 6-year post-thinning period have been heavy on all of the plots as is indicated by the figures which show an aggregate loss in net cubic foot increment. Sixty-five per cent of the loss in trees on the thinned plots was occasioned by exposure (winter-killing and drouth), 35 per cent by wind and 5 per cent by porcupines. Mistletoe is prevalent, especially in the check plot. While thinning has resulted in some stimulation of diameter growth, this stimulation is too slight to be of any economic significance. The best average diameter growth for the period from 1927 to 1933, obtained on the heavily thinned plot, is equivalent to an increase of but 2-1/2 inches in 100 years. All in all, it appears that thinning in these stands, which are typical of much of the Bighorn lodgepole pine type, will not result in a satisfactory stimulation of growth, and is not justified, therefore, from a silvicultural standpoint.

Conditions are quite different in the thinned plots within the sapling stand. The moderate thinning (8 x 8 ft. spacing) has been accompanied by an average increase of .355 inch in diameter in 6 years, while the heavy thinning has resulted in a .383-inch increase. The average original diameter was approximately 2.3 inches on each plot. The net increase in volume for the 6-year period has amounted to 57 cubic feet within the moderately thinned and 60 cubic feet within the heavily thinned stand. The rate of annual increment represented by these figures is respectively 5.4 per cent and 6.3 per cent. On the basis of these returns, thinning appears to be not only desirable, but economically justified. It is intended to continue the experiment in the sapling stands.

Thinning in Black Hills Ponderosa Pine (Mt-101)

Early in the month, Loring completed the task of compiling the stand data for the four Este Creek plots (Block E) in a 28-year old stand of "dog-hair" reproduction. These plots were established last October with CCC assistance.

Cutting Methods in Engelmann Spruce (Mc-146)

The record of stand conditions and growth on the four plots of the Montezuma project, which was initiated in connection with a commercial pulpwood operation, was completed by Roeser. The results for two plots of the series, compiled in February, were reported in last month's report.

A start was also made in summarizing the data based on the second periodic remeasurement made in 1933 of the spruce type plots located near Berthoud Pass on the Arapaho Forest. Pending final returns, it may be stated that from the analysis of individual tree growth, the rate of increment during the period 1928-1933 will run very high. The stand on these plots, incidentally, averaged better than 50 M board feet (Scribner Dec. C) before cutting.

Type Study (T-1)

The air temperature records for the fourteen Fremont, three Bessey Nursery and one Monument Nursery field stations were compiled by the CWA crew of three men and a start was made in transcribing and compiling the humidity and evaporation record for these stations. With the promise that the local CWA project will be continued until May 1, assurance is had that the compilation work in the type study project (not including the final task of summarization) will be brought up to date by the beginning of the field season.

At the Fremont Station, two additional plots in the Douglas fir-spruce type, within that portion of the experimental forest that is being systematically cut over, were marked for subsequent cutting and thinning by Nira labor. Six one-acre plots will have been worked over by the time the Nira timber stand improvement program for the experimental forest will have been completed. Practically all of the time of the crew now under employment was spent during the month in rebuilding the administrative and pasture fences of the station.

----#----

MANUSCRIPTS

SOUTHWESTERN

Lexen, Bert R.	Factors Influencing the Rate of Growth in Ponderosa Pine (For Jour. of Forestry)
Miller, W. D.	The Effect of Weeding on the Survival and Growth of White and Red Pine. (For Jour. of Forestry)
Pearson, G. A.	The Public Value of Cutover Lands in the Southwest (Manuscript)
Pearson, G. A.	Grass, Pine Seedlings and Grazing (For Journal of Forestry)
Pearson, G. A. and Arthur C. McIntyre	Slash Disposal in the Pine Forests of the Southwest (For Tech. Bul.)
Ares, F. N.	Range Salting - Its Relation to Stock Distribution and Range Control (Manuscript)
Taylor, Walter P.	Significance of the Biotic Community in Ecological Studies - A Review. (For Quarterly Review of Biology)
Whitfield, C. J.	Factors Influencing Vegetation in the Sierra Ancha Mountains of Central Arizona (Manuscript)

PACIFIC NORTHWEST

Matthews, D. N.	Experience with Hazard Indicator Sticks (For Jour. Forestry)
Isaac, L. A.	Life of Douglas Fir Seed Stored in the Forest Floor (For Jour. of Forestry)

IN PRINT

Auten, John T.	Calcium and Magnesium Losses from Cultivation of Forest Land. (Jour. For. April, 1934)
Campbell, R. S. and E. H. Bomberger	The Occurrence of Gutierrezia sarothrae on Bouteloua eriopoda Ranges. (Ecology. 15: 49-61)
Frank, Bernard	Periodic Land Use Studies for More Effective Planning. (Jour. For. April, 1934)
Jemison, G. M.	The Significance of the Effect of Stand Density Upon the Weather Beneath the Canopy (Jour. For. April, 1934)
Johnson, H. M.	Technical Review "Stumpage and Log Prices for the Calendar Years 1931 and 1932," H. B. Steer, U.S.D.A. Bul. No. 44.
Johnson, H. M.	Timber Depletion in Western Washington and Western Oregon, 1925-1929. (Jour. of Forestry March, 1934)
Krauch, Herman	Does it Pay to Reserve Thrifty Mature Trees of Ponderosa Pine for Future Cuttings? (Jour. Forestry, Jan., 1934)
Krauch, Herman	Diameter Growth of Ponderosa Pine as Related to Age and Crown Development. (Jour. Forestry, Jan., 1934).
Lodewick, J. E. and H. M. Johnson	Conversion Factors - Douglas Fir Cordwood, (Jour. of For. March, 1934)
Lohman, M. L.	A cultural and taxonomic Study of Hysterium hyalinum. Papers Mich. Acad. Sci., Artz and Letters, 19: 133 - 140. 1934.
MacKinney, A. L.	Some Factors Affecting the Bark Thickness of Second-growth Longleaf Pine. (Jour. For. April, 1934).
Taylor, Walter P.	Some Animal Aspects of Reforestation and Erosion Control. (Jour. For. Jan., 1934.)